

Response to comments on the claim 18

In my previous response I explained and proved why the subject of claim 18 is not obvious. The examiner disagreed with the following comment:

The arguments regarding claim 18 are also not persuasive. The fact that two-way communication is not common is not evidence that it is not obvious to implement two-way communication with disk drives. The extra expense of enabling two-way communication and the generally sufficient data rates achievable with one-way communication may be the reason why had drives commonly use two-way communication. But to the skilled artisan who desired faster data rates than one-way communication provides, it would have been obvious to use two-way communication to speed up the access time.

In fact, two-way communication does not increase the data rate, nor it is present in my claim 18 to achieve that. Data rates usually remain constant between any particular hard disk drive and its host. Two-way communication may only reduce, not increase this data rate due to various physical limitations, such as (and not limited to):

- ☐ interference of signals, such as interference caused by additional wires present to facilitate communicating in additional direction or of the secondary direction signal present on the same wire
- ☐ maximum number of wires available between the hard disk drive and its host may be limited, so facilitating two-way communication would divide the wires available and, therefore, proportionally reduce the data rate

Therefore, a skilled artisan who is looking for increased data rate would have never thought of switching from one-way to two-way communication for this reason. One way communication can always provide equal or higher data rates than two-way communication, having the same set of physical limitations. With prior art technology half-duplex communication is providing the best performance as prior art hard disk drives themselves are incapable of handling simultaneous reads and writes anyway.

Furthermore, a skilled artisan seeking to speed up the access time would make improvements to reduce the communication, other electrical/logic (such as by using improved protocols and reducing the waiting caused by slow performance of on-board logic) and mechanical latencies (such as by enhancing the head arm actuators).

Full duplex two-way communication can not significantly reduce the latency over the one-way communication. It can only improve certain aspects of the communication protocol, such as various handshaking and acknowledgement. However, these are well optimized already and contribute very little to the overall latency. Shortcomings of full duplex two-way communication that reduce the data can have a more significant impact, thereby cancelling out any performance increase achievable by minute reduction of latency. Furthermore, this two-way communication is not truly independent and would only serve the purpose of improving the communication speed in either one direction.

In my invention two-way communication does not improve data rates, nor does it speed up access times. In fact, it may somewhat reduce the maximum achievable data rate, as mentioned above in this response. What it does do is increase the efficiency of the entire system by allowing the host to simultaneously perform a multiplicity of operations with the hard disk drive (system) as described in my invention. For example, a system could both read one sector and write another at the same time.

Again, this does not improve the data rate. The "read" data rate is not any faster than it would have been with the one-way communication – if anything it may be slower. Same is true for "write" data rate. Although this does not improve the communication speed (data rate) in any direction, or access times, it can make the application running in the host work faster.

For example, a simple application that reads one file and writes another (e.g. simple file copy, video format conversion, etc.) normally causes the prior art hard disk drive to read a part of the source, then move its heads to the destination, write a part, then move its heads back to where it left off in the source, etc. When one or more CPUs are capable of transferring (and encoding) such data faster than hard disk drive transfer rate then, with the current system will need at least twice amount of time it takes to read the entire stream to perform the entire encoding process – and that does not include any latencies, seek times, etc.

There is absolutely nothing that can be done to significantly improve the performance of such a prior art hard disk drive to perform better. Not even enhancing it with the full-duplex two-way communication interface would help because the hard disk drive itself is incapable of performing the read and write at the same time.

My claim 18 pertains only to and is only a part of my invention. In my invention, a hard disk drive (system) with multiple independent sets of heads can actually allocate one set of heads for the "read stream" and another for the "write stream". Neither set of heads would need to move significantly if the data is not fragmented. They would only occasionally need to move to the next cylinder. Furthermore, "read heads" would be able to continuously supply the host system with the source data at the same time the "write heads" could store the encoded result. The data rate remains the same or lower than in previous example. Access times are not changed either. However, the need to continuously move heads and switch the mode of operation is eliminated. With CPUs fast enough

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(as assumed in the first case) the entire operation could take exactly the same time it takes to either read the entire file or write it with one set of head, whichever is longer. In a general case this would be at least twice as fast as in the previous example, even with somewhat slower data rates!

This functionality is not available in any prior art. It is only available within my invention. Therefore, the two-way communication claim I make is only applicable to my invention and none other. It simply does not bring any or sufficient improvement to any prior art hard disk drives.

The examiner notes that a skilled artisan who desired faster data rates would use two-way communication. I have proven that this is not and will not be the case. Therefore, this is not obvious to the examiner who is, presumably, a skilled artisan in the area. Furthermore, two-way communication with hard disk drives is not only "not common" but non-existent in spite of many skilled artisans working in the area for the entire evolution of a modern computer. Yet this has continuously been demanded by the market and only minute steps were made, always by only improving the speeds by a very small amount. Hard disk drives available today, expensive or not, are all alike when compared to my invention. If my invention is or was obvious it certainly would have been invented and used before. But it was not.

Examiner mentions that the "extra expense of enabling two-way communication and generally sufficient data rates achievable with one-way communication may be the reason why hard drives commonly use two-way communication" (I will take that the use of "two-way" here is in error and that it should have said "one-way" because two-way communication is not only not common but non-existent between the host and hard disk drives). First and foremost, two-way communication does not address data rates, as explained previously. Further, the acceptable expense and satisfactory data rates are related. A particular user may need or desire certain performance. If this is within acceptable expense the

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solution may be acquired, otherwise it will not. Today's users pay significant amounts of money to gain extra performance, by combining multiple hard disk drives into a RAID system, for example or high end hard disk drives. But any of these is more expensive to make than my entire invention. Yet my invention can enable applications to perform faster than with those, more expensive systems. Furthermore, there is an issue of power and space consumption and space requirements that can all be treated as expense. My invention proves to be more economical in all of them given performance requirements. Therefore, this statement does not describe the current situation and certainly not why two-way communication is not common.

Furthermore, claim 18 is not obvious even within the domain of my invention. Examiner mentions the improvement of data rates and access times. My invention does address those issues but at the mechanical, not communication level. My claim 18 has nothing to do with either data rates or access times. Even without such a system my invention could perform faster than prior art hard disk drives. However, it would be underutilized and therefore would not reveal its true potential. Claim 18 relates to the improvement that increases the utilization factor of the hard disk drive as per my invention.

Since it is:

- ☐ not common
- ☐ non existent
- ☐ not invented previously
- ☐ not apparent to the examiner
- ☐ not apparent to skilled artisans in the industry

... then it is definitely not obvious.

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General Comments

US PTO Advisory Action states that my notice of appeal is being considered as a Petition Regarding Election/Restriction and that this matter will be decide by the Commissioner for Patents or one of his assigned representatives.

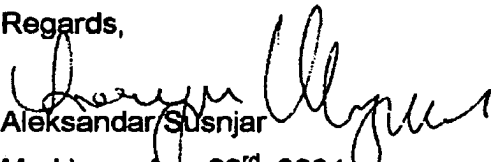
I am unsure what does this mean to any requests for continued examination and when do I have to file them as I found this on US PTO web site regarding 37 CFR 1.114:

If an applicant timely files a submission and fee set forth in § 1.17(e), the Office will withdraw the finality of any Office action and the submission will be entered and considered. If an applicant files a request for continued examination under this section after appeal, but prior to a decision on the appeal, it will be treated as a request to withdraw the appeal and to reopen prosecution of the application before the examiner. An appeal brief under § 1.192 or a reply brief under § 1.193(b), or related papers, will not be considered a submission under this section.

I do not wish to redraw my appeal nor petition and the decision has not been made yet. I am certain that if carefully reconsidered it will enable the allowance of my application.

Please advise me on time what should my next step be in this contradictory situation. I will submit the request for continued examination timely, if and as necessary and with appropriate fees.

Regards,



Aleksandar Susnjar

Markham, Aug 23rd, 2004